

11 (amended once) The method of claim 7, wherein said calculating step comprises calculating the predicted bone-dry coated weight of a size after grade change according to said size's bone -dry coated weight before grade change, said size's concentration before grade change, and said size's concentration setpoint after grade change; and wherein said evaluating step comprises determining said web's moisture percentage after grade change at an after-dryer part inlet from said predicted bone-dry coated weight.

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14 (amended once) The system of claim 10, wherein said moisture percentage prediction block calculates the bone-dry coated weight of said size after grade change according to equation 3 below, as well as the after-dryer part inlet moisture percentage of said size coated web after grade change according to equation 4 below:

$$CW' = CW \cdot \frac{S_I'}{S_I} \dots\dots\dots (3)$$

absolute after-dryer part inlet moisture percentage =

$$\frac{absMo + CW' \cdot \frac{100 - S_I'}{S_I'}}{BD_{AFT}} \dots\dots\dots (4)$$

where

CW = bone-dry coated weight before grade change;

CW' = predicted bone-dry coated weight after grade change;

S_I = size's concentration before grade change;

S_I' = size's concentration setpoint after grade change;

$absM_o$ = amount of moisture per unit area of web before size coating

(calculation by simulation); and

BD_{AFT} = bone-dry coated weight at dryer outlet.

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15 (amended once) The paper machine control system of claim 10, wherein the moving averages of measured values are used as the flow rate and concentration of said size.

16. (amended once) The paper machine control system of claim 7, wherein the moving averages of measured values are used as the flow rate and concentration of said size.

17 (amended once) A method of controlling a paper machine wherein a web is wound around steam drums of a steam dryer along with canvas so that said web is dried, and the steam pressure after grade change applied to each steam drum is predicted and controlled in order to change the moisture percentage of said web toward a given setpoint during grade change, comprising the steps of:

adapting thermal equilibrium equations between said steam drum and said canvas, between said steam drum and said web, and between said canvas and said web, and rewriting said thermal equilibrium equations into difference equations;

acquiring at least the stem pressure of said steam dryer, basis weight of said web, machine speed, and dryer part outlet moisture percentage of said web, by using sensors;

applying an initial after-dryer part inlet moisture percentage of said web, as well as other initial values, to said difference equations;

solving said difference equations repeatedly at a given time interval corresponding to a difference traveled by said web;

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determining the drying rate coefficient of said web and a pattern of said web's steady state moisture percentage transition along the direction in which said web moves within said dryer part, by repeating said solution step until a calculated final moisture percentage agrees with an actual measured value acquired with a sensor to within a given tolerance range;

acquiring at least the preset basis weight of said web, preset machine speed, and preset dryer part outlet moisture percentage of said web as operating process variables after grade change when making a grade change;

applying a value to said difference equation as the initial dryer part inlet moisture percentage of said web;

varying said steam pressure applied to each of said steam drums, in order to make said calculated final moisture percentage agree with said initial dryer part outlet moisture percentage to within a given tolerance range;

solving said difference equations repeatedly at a given time interval corresponding to a distance traveled by said web;

determining a pattern of said steam pressure applied to each of said steam drums along the direction in which said web moves; and

varying said steam pressure applied to each of said steam drums, so that the variation of said steam pressure agrees with said steam pressure pattern when an actual grade change is made.

18 (amended once) A system of controlling a paper machine wherein a web is wound around steam drums of a steam dryer along

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with canvas so that said web is dried, and a steam pressure after grade change is applied to each steam drum is predicted and controlled in order to change the moisture percentage of said web toward a given setpoint during grade change, comprising:

storage means for adopting thermal equilibrium equations between said steam drum and said canvas, between said steam drum and said web, and between said canvas and said web, and storing said thermal equilibrium equations as difference equations;

detection means for acquiring at least the steam pressure of said steam dryer, basis weight of said web, machine speed, and dryer part outlet moisture percentage of said web;

calculation means for applying an initial after-dryer part moisture percentage of said web, as well as other initial values, to said difference equations, solving said difference equations repeatedly at a given time interval corresponding to a distance traveled by said web, and determining the drying rate coefficient of said web and a pattern of said web's steady-state moisture percentage transition along the direction in which said web moves within said dryer part, by repeating said solution step until a calculated final moisture percentage agrees with an actual measured value acquired with a sensor to within a given tolerance range;

setting means for acquiring and setting at least the preset basis weight of said web, preset machine speed, and preset dryer part inlet moisture percentage of said web as operating process variables after grade change when making a grade change;

input means for applying a value to said difference equations as the initial dryer part inlet moisture percentage of said web;

another calculation means for varying said steam pressure applied to each of said steam drums, in order to make said calculated final moisture percentage agree with said initial dryer part outlet moisture percentage to within a given tolerance range, solving said difference equations repeatedly at a given time interval corresponding to a distance traveled by said web, and determining a pattern of said steam pressure applied to each of said steam drums along the direction which said web moves; and

variation means for varying said steam pressure applied to each of said steam drums, so that the variation of said steam pressure agrees with said steam pressure pattern when an actual grade change is made.
